

6 modeling performance attributes of a plurality of different components
7 which may be used in said communications network;

8 specifying components from said plurality of different components to
9 be used in said communications network;

10 specifying locations within said physical space for a plurality of
11 different components in said computerized model; and

12 predicting a performance metric for said communications network
13 which factors in said different objects, said performance metric being
14 selected from the group consisting of throughput, error rates, packet latency,
15 packet jitter, symbol jitter, quality of service, security, coverage area,
16 bandwidth, bit error rate, packet error rate, frame error rate, round trip time,
17 dropped packet rate, queuing delay, capacity, signal level, interference level,
18 bandwidth delay product, handoff delay time, signal-to-interface ratio, signal-
19 to-noise ratio, physical equipment price, and [installation] cost information.

2. The method of claim 1 wherein said computerized model generated in
said generating step includes objects which create noise or interference, said
noise or interference being an attribute of said object which is factored in
said predicting step.

3. The method of claim 1 wherein said performance metric predicted in said
[performing] predicting step is predicted in a forward direction in said
communication network.

4. The method of claim 1 wherein said performance metric predicted in said
[performing] predicting step is predicted in a reverse direction in said
communication network.

9. A method for designing, deploying [and] or optimizing a communications

2 network, comprising the steps of:

3 generating a computerized model of a physical space, said physical
4 space having a plurality of different objects therein each of which has
5 attributes which impact performance of a communications network;

6 modeling performance attributes of a plurality of different components
7 which may be used in said communications network;

8 specifying components from said plurality of different components to
9 be used in said communications network;

10 specifying locations within said physical space for a plurality of
11 different components in said computerized model;

12 predicting a performance metric for said communications network; and

13 using a table look up to relate empirically measured network
14 performance metrics to a predicted performance metric.

1 10. The method of claim 9 wherein said performance metric is selected from
2 the group consisting of throughput, error rates, packet latency, packet jitter,
3 symbol jitter, quality of service, security, coverage area, bandwidth, bit error
4 rate, packet error rate, frame error rate, dropped packet rate, queuing delay,
5 capacity, signal level, interference level, round trip time, bandwidth delay
6 product, handoff delay time, signal-to-interface ratio, signal-to-noise ratio,
7 physical equipment price, and [installation] cost information.

1 11. A method for designing, deploying [and] or optimizing a
2 communications network, comprising the steps of:

3 generating a computerized model of a physical space, said physical
4 space having a plurality of different objects therein each of which has
5 attributes which impact performance of a communications network;

6 modeling performance attributes of a plurality of different components
7 which may be used in said communications network;

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8 specifying components from said plurality of different components to
9 be used in said communications network;
10 specifying locations within said physical space for a plurality of
11 different components in said computerized model;
12 using a table look up of empirically measured network performance
13 metrics to [predict] provide or generate a prediction of a performance metric.

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1 12. A method for analyzing a communications network, comprising the steps
2 of:
3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of components used in said communications network, said
7 computerized model having modeled attributes for each of said components;
8 positioning data collection measurement devices within said physical
9 space;
10 identifying locations within said computerized model which correspond
11 to said measurement devices;
12 measuring field measurement data with said data collection
13 measurement devices; and
14 predicting a performance metric for said communications network
15 based on said field measurement data, said modeled attributes for said
16 components, and said locations of said components within said computerized
17 model.

1 13. The method of claim 12 wherein said computerized model is three
2 dimensional.

1 14. The method of claim 12 wherein said data collection measurement

2 devices used in said positioning step are portable.

1 15. The method of claim 12 wherein said positioning step includes of the
2 step of affixing said data collection measurement devices permanently within
3 said physical space.

1 16. The method of claim 12 wherein said performance metric predicted in
2 said predicting step is selected from the group consisting of throughput, error
3 rates, packet latency, packet jitter, symbol jitter, quality of service, security,
4 coverage area, bandwidth, bit error rate, packet error rate, frame error rate,
5 dropped packet rate, queuing delay, round trip time, capacity, signal level,
6 interference level, bandwidth delay product, handoff delay time, signal-to-
7 interface ratio, signal-to-noise ratio, physical equipment price, and cost
8 information.

1 17. The method of claim 12 wherein said step of measuring is performed
2 manually.

1 18. The method of claim 12 wherein said step of measuring is performed
2 autonomously.

1 19. The method of claim 12 further comprising the step of storing said field
2 measurement data.

1 20. The method of claim 12 further comprising the step of updating said
2 computerized model generated in said generating step.

1 21. The method of claim 20 wherein said step of updating includes the steps
2 of:

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3 specifying components from a plurality of different modeled
4 components which are to be used in said communications network, said
5 modeled components including descriptions and attributes of a specific
6 component; and

7 specifying locations within said physical space for a plurality of
8 different components in said computerized model.

1 22. The method of claim 21 wherein said step of updating further includes
2 the step of specifying an orientation for at least one component specified in
3 said first specifying step at said location specified in said second specifying
4 step.

1 23. The method of claim 12 wherein said computerized model in said
2 generating step identifies orientations of said components at said locations
3 within said physical space and said predicting step utilizes said orientations.

1 24. The method of claim 12 wherein said computerized model generated in
2 said generating step includes objects which create noise or interference, said
3 noise or interference being an attribute of said object which is factored in
4 said predicting step.

1 25. The method of claim 12 wherein said performance metric predicted in
2 said predicting step is predicted in a forward direction in said communication
3 network.

1 26. The method of claim 12 wherein said performance metric predicted in
2 said predicting step is predicted in a reverse direction in said communication
3 network.

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1 27. The method of claim 12 further comprising the step of specifying data
2 transfer protocol, and wherein said predicting step uses a specified data
3 transfer protocol as a factor in predicting said performance metric.

1 28. The method of claim 12 further comprising the step of specifying a
2 network loading for said communications network, and wherein said
3 predicting step uses a specified network loading in predicting said
4 performance metric.

1 29. A system for analyzing a communications network, comprising:
2 a computerized model which shows a communications network within
3 a physical space in which said communications network is or will be
4 deployed, said computerized model identifying locations within said physical
5 space of components used in said communications network, said
6 computerized model having modeled attributes for each of said components;
7 data collection measurement devices positioned within said physical
8 space, said data collection measurement devices being represented within
9 said computerized model at locations that correspond to said data collection
10 measurement devices, said data collection measurement devices measuring
11 field measurement data for said physical space; and
12 means for predicting a performance metric for said communications
13 network based on said field measurement data, said modeled attributes for
14 said components, and said locations of said components within said
15 computerized model.

1 30. The system of claim 29 wherein said computerized model is three
2 dimensional.

1 31. The system of claim 29 wherein said data collection measurement

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2 devices are portable.

3 32. The system of claim 29 wherein said data collection measurement
4 devices are permanently affixed at said locations within said physical space.

5 33. The system of claim 29 wherein said performance metric predicted by
6 said means for predicting is selected from the group consisting of throughput,
7 error rates, packet latency, packet jitter, symbol jitter, quality of service,
8 security, coverage area, bandwidth, bit error rate, packet error rate, frame
9 error rate, dropped packet rate, queuing delay, round trip time, capacity,
10 signal level, interference level, bandwidth delay product, handoff delay time,
11 signal-to-interface ratio, signal-to-noise ratio, physical equipment price, cost
12 information.

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1 34. The system of claim 29 further comprising a means for storing said field
2 measurement data.

1 35. The system of claim 29 wherein said computerized model is stored on at
2 least one server.

1 36. The system of claim 35 wherein said computerized model is stored on a
2 plurality of servers, said plurality of servers can communicate with each
3 other.

1 37. The system of claim 36 wherein said plurality of servers have a
2 heirarchical relationship to one another in said system.

1 38. The system of claim 35 further comprising at least one portable client
2 device, said at least one portable client device can communicate with said at

3 least one server.

1 39. The system of claim 37 wherein said system includes a plurality of
2 portable client devices.

1 40. A method for analyzing a communications network, comprising the steps
2 of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of a plurality of components used in said communications network,
7 said computerized model having modeled attributes for each of said
8 components;

9 predicting propagation delay information for said communications
10 network based on said computerized model; and

11 outputting, storing or displaying said propagation delay information.

1 41. The method of claim 40 wherein at least some of said plurality of
2 components that are modeled in said generating step are used in wireless
3 communications, and wherein said predicting step factors in multipath delay
4 attributable to placement of said components which are used in wireless
5 communications.

1 42. A method for analyzing a communications network, comprising the steps
2 of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of a plurality of components used in said communications network,

7 said computerized model having modeled attributes for each of said
8 components;

9 predicting a performance metric for said communications network
10 based on said computerized model, said performance metric being selected
11 from the group consisting of frame error rate, bit error rate, and packet error
12 rate;

13 outputting, storing or displaying said performance metric.

1 43. The method of claim 42 wherein at least some of said plurality of
2 components that are modeled in said generating step are used in wireless
3 communications, and wherein said predicting step factors in multipath delay
4 attributable to placement of said components which are used in wireless
5 communications.

1 44. A method for analyzing a communications network, comprising the
2 steps of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of a plurality of components used in said communications network,
7 said computerized model having modeled attributes for each of said
8 components;

9 predicting at least one of round trip time and bandwidth delay product
10 information for said communications network based on said computerized
11 model; and

12 outputting, storing or displaying said at least one of round trip time and
13 bandwidth delay product information.

1 45. The method of claim 44 wherein at least some of said plurality of

2 components that are modeled in said generating step are used in wireless
3 communications, and wherein said predicting step factors in multipath delay
4 attributable to placement of said components which are used in wireless
5 communications.

1 46. A method for analyzing a communications network, comprising the
2 steps of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of a plurality of components used in said communications network,
7 said computerized model having modeled attributes for each of said
8 components;

9 predicting throughput of network information for said communications
10 network based on said computerized model; and

11 outputting, storing or displaying said throughput of network
12 information.

1 47. The method of claim 46 wherein at least some of said plurality of
2 components that are modeled in said generating step are used in wireless
3 communications, and wherein said predicting step factors in multipath delay
4 attributable to placement of said components which are used in wireless
5 communications.

1 48. A system for analyzing a communications network, comprising:

2 a computerized model which shows a communications network within
3 a physical space in which said communications network is or will be
4 deployed, said computerized model identifying locations within said physical
5 space of components used in said communications network, said

6 computerized model having modeled attributes for each of said components;

7 means for predicting a performance metric selected from the group
8 consisting of propagation delay information, bit error rate, frame error rate,
9 packet error rate, bandwidth delay product, quality of service and throughput
10 of network, said means for predicting making predictions based on said
11 computerized model;

12 means for outputting, storing or displaying said performance metric.

1 49. The system of claim 48 wherein said means for predicting predicts
2 propagation delay information.

1 50. The system of claim 48 wherein said means for predicting predicts bit
2 error rate.

1 51. The system of claim 48 wherein said means for predicting predicts frame
2 error rate.

1 52. The system of claim 48 wherein said means for predicting predicts
2 packet error rate.

1 53. The system of claim 48 wherein said means for predicting predicts at
2 least one of round trip time and bandwidth delay product.

1 54. The system of claim 48 wherein said means for predicting predicts
2 throughput of network.

1 55. The system of claim 48 wherein said means for predicting predicts quality of
2 service information.

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1 56. A method for designing, deploying or optimizing a communications
2 network, comprising the steps of:

3 generating a computerized model of a space, said space having a
4 plurality of different objects therein each of which has attributes which impact
5 performance of a communications network;

6 modeling performance attributes of a plurality of different components
7 which may be used in said communications network;

8 specifying components from said plurality of different components to
9 be used in said communications network;

10 specifying locations within said space for a plurality of different
11 components in said computerized model;

12 using a table look up of predicted or preset performance metrics to
13 provide or generate a prediction of a performance metric.

1 57. A method for analyzing a communications network, comprising the steps
2 of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of components used in said communications network, said
7 computerized model having modeled attributes for each of said components;

8 identifying locations within said computerized model which correspond
9 to said measurement devices;

10 downloading or inputting files of field measurement data; and

11 predicting or providing a performance metric for said communications
12 network based on said field measurement data, said modeled attributes for
13 said components, and said locations of said components within said
14 computerized model.

1 58. The method of claim 57 wherein said field measurement data obtained in
2 said downloading or inputting step is specific for said physical space.

1 59. A method for analyzing a communications network, comprising the
2 steps of:

3 generating a computerized model of a communications network within
4 a physical space in which said communications network is or will be
5 deployed, said computerized model identifying locations within said physical
6 space of a plurality of components used in said communications network,
7 said computerized model having modeled attributes for each of said
8 components;

9 predicting quality of service information for said communications
10 network based on said computerized model; and

11 outputting, storing or displaying said quality of service information.

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